



A Level Computer Science

Summer Bridging Work

Tasks

Below is a document with 21 programming tasks. For those of you who have completed the Computer Science GCSE I want you to do tasks 5 – 12. Some of these tasks are quite hard so you might need to either use the Internet or even better send me an email for a bit of help. If you have not studied Computer Science at GCSE then have a go at tasks 1 – 8. I will be seriously impressed with anyone who can complete any of the tasks from 13 and upwards.

Reading

Please read the three chapters from Dr Paul Curzon's book on Computer Science, Computing without Computers. These chapters cover the main constructs of programming that we will cover over the year, Selection, Iteration and Functions and Procedures. It might look like a lot of pages but a lot of it is made up of diagrams and lists. I want you to read through the chapters and write one side of A4 for each chapter summarising what was covered.

Programming Exercises

1	Hello World!	Sequence	A simple program that outputs "Hello World!" when run
2	Chatty Robot	Sequence / variables	A chat between the user and the program, this can go on for as long as you want and can have questions such as 'how are you?', 'what music do you like?' etc.
3	Calculator	Operators / Buttons / Variables	This makes use of buttons, the user enters two numbers and the program performs one of the following operations: addition, subtraction, multiplication, division, first to the power of the second, square root of first
4	Dice Role Game	Random Function	The user presses a button and the program finds a random number between 1 and 6, this will be needed in future programs.
5	Temperature Converter	IF / Operators	A program that asks the user to choose between Centigrade and Fahrenheit, the user enters a temperature and the computer converts it.
6	Random Number Guessing Game	If / Do while loop / Random function	The program generates a random number between 1 and 100, the user tries to guess, if the user guesses too high, the program should output "lower", while if the user guesses too low, the program should output "higher" until the user finds the number.
7	Age to days converter	Built in Functions	The user enters their age in years, the computer converts it into total days (or hours etc). This will need the date function.
8	Currency Converter	Select Case	The user chooses an initial currency (Euro, Dollar, Pound, Yen), enters an amount and then chooses a target currency. The program converts the amount. The user should have the option of updating the exchange rate.
9	10 second guessing game	Built in Functions	The user presses a key to start a clock. The user must press another key to stop the clock when they think 10 seconds have passed. The program shows them their actual time.
10	Logic Gates	Logic Decisions	The user enters the Logic Gate (AND, OR, NOT) and 2 numbers (1 or 0). The program works out the result. As an extension the program should also work for NAND and NOR.
11	Rock, Paper, Scissors	If / Do While loop	A game against the computer, the user selects either rock, paper or scissors, the computer picks one at random and outputs the winner,
12	Capital Cities Game	For loop / Arrays	You will need 2 arrays, one for countries, one for capitals, the program gives the user a country, the user has to enter the capital city, the game should keep track and output a score.
13	Black Jack	Buttons / Random Function	The user presses a button to hit and tries to get as close to 21 as possible, the program picks a random number between 15 and 24, the closest to 21 wins. This could be extended to include placing bets.
14	Binary Calculator	Arrays / String Manipulation	The user enters an 8 bit binary number, the program converts it into a decimal number and vice versa. This can be expanded to include conversion to Octal and Hex

15	Basic Encryption / Decryption	String Manipulation	This uses strings and ASCII. The user enters a word or sentence, the program reads it and encrypts it by finding each letter's ASCII equivalent and changing it by a few places. This can then be reversed to decrypt the string.
16	Hangman	Arrays / File Manipulation	Words are stored in an array. The program chooses a word at random. The user guesses a letter, if it is correct the position of the letter in the word is shown. The user has 8 guesses to find the whole word.
17	Treasure Hunt	2-Dimensional arrays	Create a two dimensional array of integers 10 by 10. Place a number in a random position, the user has to guess the coordinates of the number. You can add some feedback after each guess, i.e hot, cold, warm etc.
18	Snakes and Ladders	Select case	This is a two player game. The players click on a button to roll a die (random number between 1 and 6). The first to reach but not go above 100 wins. If they land on certain numbers they go back/forward a number of places.
19	Roman Numerals	Subroutines	The user enters a number using roman numerals, the program converts it into a decimal number. This program should use subroutines if possible. As an extension, the program should also add roman numerals and convert from decimal to roman numerals.
20	Fibonacci Number generator	Variables	This program should create a Fibonacci number sequence starting from a number specified by the user. 1,1,2,3,5,8,13,21,34,55 etc
21	Battleships	2-Dimensional array	The user chooses the size of ship (Frigate, Destroyer, Cruiser)